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PREFACE

It is great pleasure that, Ho Language Education Council, Odisha, Thakurmunda has introduced/ published a Ho Algebra Text book for Secondary class (Class-X) students. Which is prepared by Board of writers and editors in Ho language and warangchity script for first time, following the NCERT curriculum and frame work in the current academic session. Looking forward to the bare necessity of the Ho language studied students, the topics, Arithmetic progression, Probability are taken in this text book. It might not be easily conceptualized to their understanding; pupils as well as teachers are not firmly co-related with the mathematics oriented Ho language text book before. But it is expected with a sure aspiration that, it must be simple understanding and fascinating gradually by the course of time.

Eventually, the board of writers and editors have prepared algebra text book into Ho language by dint to their reckless endeavour and devotion. Still any linguistic and spelling error found in the first experimental edition must be paid and special attaintion to manifest the noble aspiration behind it and trying our best effort to enrich at a global standard of Ho language Algebra book for the students in the coming days.

Padma Charan Haiburu
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3. [illegible] (Statistics) [illegible]

[illegible] (Mean)
[illegible] (Median)
[illegible] (Mode)

[illegible]

[illegible]

1.1. [illegible] -

[illegible] (order) [illegible] - 2, 4 ,6, 8…….1, 3 ,5, 7……………. $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}$ ……………, 2, 6, 18, 54……[illegible].

[illegible] (item) [illegible] — t_1, t_2, t_3,t_4…….. [illegible] t_1,t_2, t_3, t_4 [illegible] n-[illegible] t_n [illegible]. n-1 [illegible] (General item) [illegible].

[illegible] t_{n+1}= t_{n+1} = ……..= 0 ([illegible]) [illegible] t_1, t_2…….t_n [illegible] (finite sequence) [illegible] $\{t_n\}$ [illegible].

[illegible] (progression) [illegible] –

(i) [illegible] (Arithmetic progression)

(ii) [illegible] (Geometric progression)

(iii) [illegible] (Harmonic progression).

[illegible]

1.2. [illegible] (Arithmetic progression) –

[illegible] (A.P) [illegible] (common difference) [illegible] d [illegible]

$t_2 - t_1 = t_3 - t_2 = t_4 - t_3 .... = t_n - t_{n-1} = d$ [illegible]

1.2.1 [illegible] n – [illegible]

[illegible] A.P [illegible] a [illegible] d [illegible] –

$T_1 = a$

$T_2 = a+d = a+(2-1)d$,

$T_3 = a+2d = a+(3-1)d$

$T_4 = a+3d = a+(4-1)d$

…………………………….

…………………………….

$T_n = a+(n-1)d$. [illegible] A.P. [illegible] a, a+d, a+2d, a+3d ……., a+ (n-1)d. [illegible] n [illegible] –

$T_n = a+(n-1)d$

[illegible] – A.P. [illegible] a [illegible] d [illegible].

[illegible] – 1 .

[illegible] A.P. [illegible].

(i) -18, -16, -14, -12, ……………..

[illegible] a = – 18 [illegible] d = – 16-(-18) =-14 (-16) =-12 – (-14) =2.

(ii) -11, 0, 11, 22, 33, 44, …………………….

[illegible] a-11 [illegible] d = 0— (-11) =11-0 =22-11 =11

(ii) $\frac{1}{3}, \frac{2}{3}, 1, \frac{4}{3}, \ldots\ldots\ldots\ldots$

[illegible] $a = \frac{1}{3}$ [illegible]

$d \; \frac{2}{3} - \frac{1}{3} = 1 - \frac{2}{3} = \frac{4}{3} - 1 = \frac{1}{3}.$

[illegible] A.P [illegible] t_n [illegible] –

(i) $t_n = -18 + (n-1)2 = -18 + 2n - 2 = 2n - 20$

([illegible] $t_n = a + (n-1)d$ [illegible].)

(ii) $t_n = -11 + (n-1)11 = -11 + 11n - 11 = 11n - 22.$

(iii) $t_n = \frac{1}{3} + (n-1)\frac{1}{3} = \frac{1}{3} + \frac{1}{3}n - \frac{1}{3} = \frac{1}{3}n.$ [illegible] A.P [illegible], [illegible] a, n [illegible] t_n [illegible].

[illegible] A.P. [illegible].

[illegible] $t_n = -18 + (!0-1)2 = -18=18 = 0.$

1.2.2 [illegible] n – [illegible] –

A.P. [illegible] n [illegible]. [illegible] 1 [illegible] 100 [illegible].

[illegible]

[illegible] S_{100} [illegible]–

$$S_{100} = 1 + 2 + 3 + \ldots\ldots + 98 + 99 + 100$$

$$\underline{S_{100} = 100 + 99 + 98 + \ldots\ldots + 3 + 2 + 1}$$

[illegible] $2S_{100} = 101+101+101\ldots\ldots101+101+101$

[illegible] $2S_{100} = 101 \times 100 \Rightarrow S_{100} = \frac{101X100}{2} = 5050$.

[illegible] a, a+d, a+2d, a+3d [illegible] n [illegible]. [illegible] n [illegible] $t_n = a+(n-1)d = l$ [illegible]. [illegible] $= l$, [illegible] $= l - d$, $l - d$ [illegible] $= l-2d$ [illegible].

[illegible] n [illegible] S_n. [illegible] $S_n = a+(a+d)+\ldots\ldots+(l-d)+l$

$S_n = l + (l-d)+\ldots\ldots+(a+d)+a$ ([illegible]). [illegible] $2S = (a+l) + (a+l)+\ldots\ldots n$ [illegible]. [illegible] $2S_n = n(a+l)$ [illegible] $S_n = \frac{n}{2}(a+l)$. [illegible] n [illegible] $S_n = \frac{n}{2}(a+l)$.

[illegible] $S_n = \frac{n}{2}$ ([illegible] + n [illegible]).

[illegible] l=a+(n-1)d [illegible] $S_n=\frac{n}{2}(a+a+(n-1)d \Rightarrow S_n = \frac{n}{2}\{(2a + (n-1)d\}$

[illegible] n [illegible] $= S_n = \frac{n}{2}\{2a+(n-1)d\}$

[illegible]- 3 [illegible] –

(i) [illegible]

(ii) [illegible],

(iii) [illegible]

(iv) [illegible].

[illegible] – [illegible] a [illegible] d [illegible] a, a+d, a+2d, …….a+(n-1)d.

(i) [illegible] k [illegible] (a+k), (a+k)+d, (a+k)+2d………..(a+k)+(n-1)d [illegible]. [illegible] a+k [illegible] d [illegible]. [illegible] (ii), (iii), [illegible] (iv) [illegible].

[illegible] - 2

(a) [illegible] 15 [illegible] 85 [illegible].

(b) [illegible] A.P. [illegible] 4 [illegible] 3 [illegible]

(i) A.P. [illegible],

(ii) A.P. [illegible] 33 [illegible] (t_n) [illegible]

(iii) A.P. [illegible] (S_{40}) [illegible].

[illegible]-

(a) 1 [illegible] 85 [illegible] 85 [illegible] 1 [illegible] 14 [illegible] 14 [illegible].

[illegible] 15 [illegible] 85 [illegible] = 85-14 =71 [illegible].

[illegible] - 15 [illegible] 85 [illegible] =

(85-15) +1=71

[illegible] 15 [illegible] 85 [illegible] = S_{71}. [illegible]

S_n =15+16+17+18……83+84+85 [illegible]

S_n = 85+84+83+82……..17+16+15 ([illegible])

$2S_n$ =100+100+100…….100+100+100

[illegible] $2S_n$= 100X71 [illegible] $S_n = \frac{100X71}{2}$ =50 x 71 =3550

([illegible])

[illegible] $S_{71}=\frac{71}{2}(15+85)$ = 50X71 = 3550 [

$\because S_n=\frac{n}{2}(a+l)$]

[illegible] (a) =15 [illegible] l = 85

(b) (i) A.P. =4,7,10,13,17,…………….[a=4 [illegible] d=3]

(ii) t_{33} = 4+ (33-1)X3 =100 [$\because$ t_n =a+(n-1)d]

(iii) [illegible]

$(S_n)=\frac{40}{2}\{2X4+(40-1)3\}$ =20(8+117)

$\Rightarrow S_{40}$ =20X125 [$\because S_n=\frac{n}{2}\{2a+(n-1)d\}$]

$\Rightarrow S_{40}$=2500 ([illegible])

[illegible]-3

[illegible] A.P. [illegible] t_4 =11, t_{10} =16 [illegible] , t_{21} [illegible] 40 [illegible]

[illegible] a [illegible] d,

[illegible] t_4 =11, $\Rightarrow$a+(4-1)d =11$\Rightarrow$a+3d =11……..(1)

[illegible] t_{10} =16, $\Rightarrow$a+(10 -1)d =16 $\Rightarrow$a+9d =16……….(2)

(1) [illegible] (20 [illegible] →9a=9d) – a+3d) =16 -11 $\Rightarrow$6d =5

$\Rightarrow d=\frac{5}{6}$.

[illegible] (1) $\Rightarrow a+3X\frac{5}{6}$ = 11, a= 11 - $\frac{5}{2}$ = $\frac{17}{2}$, [illegible]

[illegible] t_{21} =a+(21—1)d = $\frac{17}{2}$ +20 X$\frac{5}{6}$

= $\frac{151}{6}$ =25$\frac{1}{6}$ ([illegible]).

[illegible], $S_{40} = \frac{40}{2}[2X\frac{17}{2} + (40 - 1)\frac{5}{6}$

$] \rightarrow S_{40} = 20\,(17 + \frac{65}{2}) = 340 + 650 = 990$ ([illegible])

[illegible]- 4

2, 4, 6, 8, [illegible] S_{50} [illegible] –

[illegible] – [illegible] $t_2 - t_1 = 4 - 2 = 2$, $t_3 - t_2 = 6 - 4 = 2$, $t_4 - t_3 = 8 - 6 = 2$ [illegible]

[illegible] A.P. [illegible]

a =2, [illegible] d =2

[illegible] $S_{50} = \frac{50}{2}[\,2X2 + (50 - 12)2] = 2550$

$[\because\ S_n = \frac{n}{2}\{2a + (n - 10)d]$ ([illegible])

[illegible]-5

27+24=21+……..[illegible] 132 [illegible]? [illegible]?

[illegible] –

[illegible] a = 27, [illegible] d = 24-27 =21 -24 = -3 [illegible]. [illegible], 27, 24, 21……..A.P. [illegible].

[illegible] n [illegible]= 132.

[illegible]

$S_n = 132 \Rightarrow \frac{n}{2}[\,2a + (n-1)d\,] = 132 \Rightarrow \frac{n}{2}\{2X27 + (n-1)(-3)\} = 132 \Rightarrow \frac{n}{2}(27 - 3n) = 132 \rightarrow n(57 - 3n)$

$=264 \Rightarrow -3n^2+57n-264=0 \Rightarrow n^2-19n+88$
$=0 \Rightarrow (n-1)(n-8)=0. \Rightarrow n=11$ [illegible] 8 A.p [illegible] 11 [illegible] 132 [illegible] 8 [illegible] 132 [illegible].

[illegible] $t_9=27+(9-1)(-3)=3$,
$t_{10}=t_9+d=3+(-3)=0$
$T_{11}=t_{10}+d=0+(-3)=-3 \Rightarrow t_9+t_{10}+t_{11}$
$=3+0+(-3)=0 \Rightarrow S_{11}=S_8+t_9+t_{10}+t_{11}=S_8+0=S_8.$ [illegible] 8 [illegible] 11 [illegible] 132 [illegible]. ([illegible])

[illegible]-6

[illegible] $t_n=2n+$ [illegible] S_n [illegible]?

[illegible] – $t_n=2n+3$ [illegible] n [illegible] 1 [illegible]. $T_1=2X1+3=5 \Rightarrow a=5$, [illegible] n [illegible] 2 [illegible] 3 [illegible]

$T_2=2X\,2+3=7$ [illegible] $t_3=2X3+3=9$, $t_3-t_2=9-7=2$ [illegible]

$t_2-t_1=7-5=2 \ \therefore t_3-t_2=t_2-t_1=2.$ [illegible] 2 [illegible]
A.p. [illegible]. [illegible] $d=2$.

$S_n=\frac{n}{2}[2a+(n-1)d]=\frac{n}{2}[2X5+(n-1)X2]$

$=\frac{n}{2}(10+2n-2)=\frac{n}{2}(2n+8)=n(n+4)=n^2=4n$
([illegible])

[illegible] – n [illegible].

ꝗvʋvyʋ n =30 ᖷrzy ʋʋ, S_{30} ßz zꝍ ᖷßzy ɾy. Ɐ ʋ

$S_{30} = 30^2 + 4x\,30 = 900+120 = 1020.$

⊢ᒣLLIJLᐅ -7

ꝗfßr ɞfVfy ʋßy$S_n = 3n + 4n^2$ ʋ t_7 z ʋzV ɡfɡf?

ꝁɾʋfꝋ ɡLꝋf– Ꭻɾɾ ᓂL $S_n = 3n+4n^2$, (n-1) Vzz ʋßy ʋɡfr ɛLf (S_{n-1}) ʋzᓂɾ ʋ (S_n ʋ n ᓂz zꝋ ɞʋ n- 1 ʋfɡß ʋ), $S_{n-1} =3(n-1)+ 49n -1)^2$ $3n -3 +4n^2 – 8n +4 = -5n +4n^2 +1$, ɡʋ $S_n =S_{n-1}+ t_n \rightarrow 3n +4n^2 = - 5n = 4n^2+1+t_n \rightarrow t_n\, 8n- 1$ …..(i)

$\therefore t_7 = 8x7- 1 = 55$ [(i) ʋ ʋßy ɲzʒ 7 ʋfɡß ʋ]

⊢ᒣLLIJLᐅ-8

Vzʋʋʒɲß Vʋ ɡf, ɛLf a^2, b^2 ,c^2 ɾVɡɾ ɡz A. P. ʋ ɡy ʋ ʋ $\frac{1}{b+c}$, $\frac{1}{c+a}$,$\frac{1}{a+b}$ ʋ ɞᖷɾ.

ꝁɾʋfꝋ ɡLꝋf– a^2 ,b^2, c^2, ɡz A. P. ʋ ɡy ꝋɲʋr ɞʋ ab+bc+ca ɡz ʋ ɡfrʋ ʋ ɡɾ ɾVɡɾ ɡzz ɲʋ A. P. ʋɲʋ ɞᖷɾ (3 ʋꝋʋ Vʋ)

Ɐ ʋ $a^2+2ab + bc + ca$, $c^2 +ab +bc +ca$ ɡz A. P. ʋɡz ɞᖷ ɾ.

$\Rightarrow a(a+b) + c(a+b), b(a+b) + c(a+b) , c(b+c) +a+(b+c)$ A. P. ʋ ɡy ɡzɾ.

⇒(a+b) (c+a) , (a+b) (b+c), 9b+c) (c+a) A.P. [illegible].
[illegible] (a+b)(b+c)(c+a) [illegible] A.P. [illegible].

$\therefore \frac{1}{b+c}, \frac{1}{c+a}, \frac{1}{a+b}$ [illegible] A.P. [illegible]. ([illegible])

[illegible] - 9

[illegible] A.P. [illegible] $t_{m+n}+t_{m-n} = 2t_m$

[illegible] A.P. [illegible] a [illegible] d

[illegible] $t_{m+n} = a(m+n-1)d$ ar $t_{m-n} = a + (m-n)d$,

$t_{m+n} + t_{m-n} = (a+a) + (m+n-1+m-n-1)d =$

$2a + (2m-2)d = 2\{a + (m-1)d\} = 2t_m$. $\therefore t_{m+n} + t_{m-n}$ $= 2t_m$. ([illegible])

[illegible] - 1 (a)

([illegible])

1. [illegible] .

(i) 1, 2, 3, 4,…[illegible] t_8 = ……………………[(a) 6,(b) 7, (c) 8, (d) 9]

(ii) 2,4,6,8 ……[illegible] t_7 = ……………………….[(a) 12 (b) 14 (c) 16 (d) 18]

(iii) – 5, -3, - 1, 1 …………….[illegible] t_{11} = ………………
[(a) 13 (b) 15 (c)17 (d) 19]

(iv) 3, 6, 9, ……………..[illegible]

d =……………….[(a) 3 (b) 4 (c) 5 (d) 6]

(v) - 4, -2, 0, 2…………A.P. [illegible]

d = ……….[(a) -2 (b) -3 (c) 2 (d) 3]

(vi) 10.2, 10.4, 10.6, 10.8……….[illegible]

t_5 = ……………..[(a) 11.0 (b) 11.2 (c) 11.4 (d) 11.6]

(vii) 2.5, 2.9, 3.3, 3.7,……..A.P. [illegible]

d = …………..[(a) 1.5 (b) 1.4 (c) 0.5 (d) 0.4]

(viii) 3, x, 9 ……[illegible] A.P. [illegible] x = ……………..

[(a) 4 (b) 5 (c) 6 (d) 7]

(ix) 1.01, 1.51, 2.01, 2.51….A.P. [illegible] d = [(a) 1 (b) 0.5 (c) 1.5 (d) 1.05]

(x) 5, 0, - 5, - 10, …..A.P. [illegible] d = [(a) -5 (b) 5 (c) – 10 (d) 10]

2. [illegible] A.P. [illegible]

(i) 1, 4, 7, 15, 16, 19, 22

(ii) 1, 8, 15, 22, 29, 36, 43, 50

(iii) 1, 6, 11, 15, 22, 28, 34, 40

(iv) 1, 4, 7, 9, 11, 14, 17, 20.

(v) -5, - 3, -1, 0, 2, 4, 6, 8.

(vi) a + a +d, a+ 2d, a+ 3d, a+4d, a+ 5d, a +6d, a+ 7d.

(vii). 0.6, 0.8, 1.0, 1.5, 1.7, 1.8, 1.9, 2.0.

(viii) -7, -4, -1, 2, 5, 8, 11, 14.

3. [illegible] 2 [illegible] A.P. [illegible]

4. [illegible] a = 5 [illegible] A.P. [illegible]

(i) d = 5, (ii) d = 4, (iii) d = 2, (iv) d= -2,

(v) d = -3 [illegible]

5. [illegible] A.P. [illegible] n [illegible] t_n [illegible] t_5, t_8, [illegible] t_{10} [illegible]

(i) $t_n = \frac{n+1}{2}$ (ii) t_n = - 10 +2n (iii) t_n = 10n+5

(iv) t_n = 4n -6

6. [illegible] A.P. [illegible] ([illegible]) [illegible],

(i) [illegible] a = 4, [illegible] d = 3. (ii) [illegible] a = - 8 , [illegible] d = - 2.

(iii) [illegible] a = 7, [illegible] d = - 4.

(iv) [illegible] a = 10, [illegible] d = 5.

(v) [illegible] $a = \frac{1}{2}$, [illegible] $d = \frac{3}{2}$.

(vi) [illegible] $a = \frac{1}{2}$, [illegible] d = -1.

7. [illegible]

(a) 1, 2, 3, 4, ...[illegible].

(b) 1, -1,1, - 1........[illegible].

(c) 2, 1, -1, -2, [illegible].

(d) [illegible] $t_n = n-1$, [illegible] A.P. [illegible].

(e) [illegible] $S_2 = \frac{n(n-1)}{2}$ [illegible] A.P. [illegible].

(f) [illegible] 3 [illegible] 2: 3 : 4 [illegible] , 3 [illegible] A.P. [illegible].

(g) [illegible] A.P. [illegible].

(h) [illegible] A.P. [illegible].

(i) 5 [illegible] A.P. [illegible].

(j) 5, x, 9, [illegible] x = 6 [illegible].

([illegible])

8. (a) 1+2+3 +…..[illegible] S_{10} [illegible]?

(b) 1+ 3+5+……[illegible] S_{10} [illegible]?

(c) 2+4+6+…..[illegible] S_{15} [illegible] ? (d) 1 – 2+ 3 – 4+ ……..[illegible] S_{30} [illegible] ?

(e) 1 – 2+ 3 – 4 +……[illegible] S_{41} [illegible] ?(f) 1+ 1 =2 + 3 + 3 …[illegible] S_{17} [illegible] ?

(g) 1 +2 +3 + 2 + 3+ 4+3 + $ +5…[illegible] S_{39} [illegible] ?

(h) -7 -10 -13 …[illegible] S_{21} [illegible] ?

(i) 10 + 6 + 2+…[illegible] S_{15} [illegible] ? (j) 20 = 9 -2 + …..[illegible] S_{25} [illegible] ?

(k) n +(n – 1) + (n – 2) +….[illegible] S_n [illegible] ?(l) 5+ $4\frac{1}{3}$ + $3\frac{2}{3}$ + …[illegible] S_{20} [illegible] ?

9. (a) [illegible] $a = 3, d = 4$,

$n = 10$ [illegible] S_n [illegible] ?

(b) [illegible] $a = -5, d = -3$,

[illegible] S_{17} [illegible]?

(c) [illegible] $t_n = 2n-1$, [illegible].

(d) [illegible] $t_n = 3n+2$, S_{61} [illegible] ?

(e) $t_n = 3n-5$ [illegible], S_{50} [illegible] ?

(f) [illegible] $t_n = 2 - 3n$, [illegible] S_n [illegible] ?

(g) [illegible] $S_n = n^2$, [illegible] t_{15} [illegible] ?

(h) [illegible] A.P [illegible] $a = 3, d = 4, S_n = 903$ [illegible] n [illegible] ?

(i) [illegible] A. P. [illegible] $d = 2, S_{15} = 285$, [illegible] ?

(j) [illegible] A. P. [illegible] $t_{15} = 30, t_{20} = 50$ [illegible] S_{17} [illegible] ?

10. (i) [illegible].

(a) 1 [illegible] 105 [illegible].

(b) 25 [illegible] 93 [illegible].

(c) 111 [illegible] 222 [illegible].

(ii) 1, 2, 3 …[illegible]

(a). S_{20} [illegible] . (b) S_{50} [illegible] ?

(iii) 32 [illegible] 85 [illegible] .

(iv). 100 [illegible]

[illegible]

(v) 150 [illegible]

[illegible]

([illegible])

11. [illegible] 17 [illegible] – 2 [illegible] 72 [illegible]?

[illegible]

12. (i) [illegible] 18 [illegible] 192 [illegible]

([illegible] – [illegible] $a - d$, $a + d$ [illegible])

(ii) [illegible] 6 [illegible] 16 [illegible] 63 [illegible], [illegible]

([illegible] $a - 5d$, $a - 3d$, $a - d$, $a + d$, $a + 3d$, $a + 5d$ [illegible])

13. [illegible] 21 [illegible] 155 [illegible]?

14. [illegible] '∇' [illegible] , [illegible], [illegible] 3: 4: 5 [illegible].

15. 100 [illegible] 5 [illegible].

16. 200 [illegible] 3 [illegible].

([illegible] – 1+2+...+199 ar 3+ 6+ ....+198 [illegible])

17. 15 [illegible] 120 [illegible].

18. A.P. [illegible] 58 [illegible] ?

19. A.P. [illegible] 8 [illegible] 15 [illegible].

([illegible] – [illegible] a – 3d, a- d, a + d [illegible] a+ 3d [illegible])

20. A.P. [illegible] n [illegible] S_1, S_2, [illegible] S_3 [illegible] 1 [illegible] 1, 2, 3 [illegible], [illegible], $S_1 + S_3 = 2S_2$.

21. [illegible] A. P. [illegible] p [illegible], q [illegible], [illegible] r [illegible] [illegible] a, b, [illegible] c [illegible]

$$a(q-r) + b(r-p) + c(p-q) = 0.$$

22. [illegible] a, b, c [illegible]

(i) $\frac{1}{bc}, \frac{1}{ca}, \frac{1}{ab}$ (ii) b + c, C+a, a+b

(iii) b + c –a , c+ a –b, a + b – c

(iv) $\frac{1}{a}\left(\frac{1}{b}+\frac{1}{c}\right), \frac{1}{b}\left(\frac{1}{c}+\frac{1}{a}\right), \frac{1}{c}\left(\frac{1}{a}+\frac{1}{b}\right).$

(v) $a^2(b+c),\ b^2(c+a),\ c^2(a+b).$

23. (i) $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}$ [illegible] A. P. [illegible] a +b +c [illegible] $\neq 0$ [illegible] $\frac{b+c}{a}, \frac{c+a}{b}, \frac{a+b}{c}$ [illegible] A. P. [illegible]

(ii) $\frac{a}{b+c}, \frac{b}{c+a}, \frac{c}{a+b}$ [illegible] A.P. [illegible] a + b + c ‡ 0 [illegible] – $\frac{1}{b+c}, \frac{1}{c+a}, \frac{1}{a+b}$ [illegible] A.P. [illegible]

24. [illegible] A.P. [illegible] a [illegible] l [illegible] r [illegible] r [illegible]

25. [illegible] p [illegible] r, [illegible] q [illegible] s [illegible] d, [illegible] $\frac{r}{p} - \frac{s}{q} = (p-q)\frac{d}{2}$ [illegible].

26. [illegible] p, q, r [illegible] a, b, c [illegible] $\frac{a}{q}(q-r) + \frac{b}{q}(r-p) + \frac{c}{r}(p-q) = 0$ [illegible].

27. [illegible] A.P. [illegible] $t_p = q$, $t_q = p$ [illegible], [illegible] $t_m = p + q - m$.
[illegible] $a + (p-1)d = q$ [illegible] $a + (q-l)d = p$ [illegible] a [illegible] d [illegible] t_{pq} [illegible].

28. [illegible] A.P. [illegible] $S_m = n$, $S_n = m$ [illegible] $S_{m+n} = -(m+n)$ [illegible].

[illegible] (Defference formulae) –

[illegible]

[illegible], $\frac{1}{n(n+1)} = \frac{1}{n} - \frac{1}{n+1}$ [$\because \frac{1}{n} - \frac{1}{n+1} = \frac{n+1-n}{n(n+1)} = \frac{1}{n(n+1)}$]

[illegible], $\frac{1}{1X2} = \frac{1}{1} - \frac{1}{2}$ [illegible] $\frac{1}{2 X 3} = \frac{1}{2} - \frac{1}{3}$. [illegible] –

[illegible] -[illegible]

$\frac{1}{1x2} + \frac{1}{2 \times 3} + \frac{1}{3x4} + \ldots + \frac{1}{n\,(n+1)}$ [illegible]

[illegible] $\frac{1}{1x2} = \frac{1}{1} - \frac{1}{2}$, $\frac{1}{1x3} = \frac{1}{1} - \frac{1}{3}$, $\frac{1}{3x4} = \frac{1}{3} - \frac{1}{4}$

....

$$\frac{1}{n\,(n-1} = \frac{1}{n} - \frac{1}{n+1}$$

[illegible] $\frac{1}{1x2} + \frac{1}{2+3} + \frac{1}{3x4} + \ldots + \frac{1}{n(n+1} = 1 - \frac{1}{n\,(n+1)}$

$\therefore S_n = \frac{n+1-1}{n+1} = \frac{n}{n+1}$ ([illegible]).

[illegible] n [illegible] -

(i) [illegible] n [illegible],

[illegible] $S_n = 1+2+3+\ldots..n.$ [illegible] =1, [illegible] =1, [illegible] = n [illegible] $S_n = \frac{n}{2}\{2x1+(n-1)\,1\} = \frac{n}{2}(2=n-1) = \frac{n\,(n+1)}{2}$....(i).

[illegible]

$1+2+3+\ldots+n = \frac{n(n+1)}{2}$

(ii) [illegible] n [illegible] –

[illegible] $S_n = 1+3+5+....n$ [illegible]

[illegible] = 1, [illegible] = 2, [illegible] = n

$S_n = \frac{n}{2}\{2x1+ (n-1)2\} = \frac{n}{2}(2 + n - 2) = \frac{n}{2} 2n$

$= n^2$..........(2)

[illegible]

1+3+5+..........+n [illegible] $= n^2$

(iii) [illegible] n [illegible] -

[illegible] $S_n = 2+4+6+.....n$ [illegible].

= 2 (1+2+3+.......n [illegible])

$= 2.\frac{n(n+1)}{2} = n(n+1)$ (i) [illegible].....(3)

[illegible]

2+4+6+.....+n [illegible] = n(n+1)

[illegible] n [illegible].

(A) [illegible] n [illegible] (Squares of Natural Numbers) [illegible]-

[illegible] $S_n = 1^2+2^2+3^2+ ....+n^2$

[illegible]- $n^3 - (n-1)^3 = n^3 - (n^3 - 3n^{2+3n} - 1) = 3n^2 - 3n + 1$.

[illegible] n [illegible] $1,2,3,4,\ldots$[illegible] $1^3-0^3=3.1^2-3.1+1$

$2^3-1^3=3.2^3-3.2+1$

$3^3-2^3=3.3^2-3.3+1$

…………………………………………………………………

…………………………………………………………………

$(n-1)^3-(n-1)^3=3(n-1)^2-3(n-1)+1$

$N^{3-}(n-1)^3=3n2\,.\,3.n+1$

$N^3=(1^2+2^2+3^2+\ldots\ldots+3n^2)-3(1+2+3+\ldots.n)+n$

[illegible]

$\Rightarrow n^3=3S_n-3\,.\frac{1}{2}n\,(+1)+n$ ([illegible] i [illegible])

$\Rightarrow 3S_n=n^3+n-\frac{3n}{2}(n+1)\rightarrow 3S_n=n^3-n+\frac{3n}{2}$

$(n+1)=n(n^2-1)+\frac{3n}{2}(n+1)$

$=n(n+1)\{(n-1)+\frac{3}{2}\}=n(n+1)\,(\frac{2n-2+3}{2})=$

$\frac{n\,(n+1)(2n+1)}{2}\Rightarrow S_n=\frac{n(n+1)(2n+1)}{6}$…………(4)

[illegible]

$$1^2+2^2+3^2+\ldots\ldots+n^2=\frac{n(n+1)(2n+1)}{6}$$

(B) [illegible] n [illegible] (Cubes of natural numbers) [illegible] – [illegible] $S_n=1^3+2^3+3^3+\ldots\ldots+n^3$

[illegible], $(r+1)^2-(r-1)^2=4r$

[illegible] r [illegible] $r^2\,(r+1)^2-(r-1)^2\,r^2=4r^3$ [illegible] r [illegible]

$1, 2, 3, \ldots\ldots\ldots n$ [illegible] n [illegible]

$1^2.2^2 - 0^2.1^2 = 4.1^3$

$2^2.3^2 - 1^2.2^2 = 4.2^3$

$3^2.4^2 - 2^2.3^2 = 4.3^3$

……………………………..

……………………………….

$(n-1)^2.\, n^2 - (n-2)^2.\, (n-1)^2 = 4\,(n-1)^3$

$N^2\,(n+1)^2 - (n-1)^2.\, n^2 = 4n^3$

[illegible] $n^2(n+1)^2 = 4\,(1^3+2^3+3^3+\ldots+3n^3)$

[illegible] $4S_n = n^2\,(n=1)^2$

$$\therefore\ S_n = \frac{n^2(n+1)^2}{4} = \left\{\frac{n(n+1)^2}{2}\right\} \ldots\ldots(5)$$

[illegible]

$1^3+2^3+3^3+\ldots\ldots\ldots+n^3 = \left\{\frac{n(n+1)^2}{2}\right\}$

[illegible]

$1^3+2^3+3^3+\ldots\ldots\ldots+n^3 = (1+2+3+\ldots\ldots+n)^2$

[illegible] n [illegible], [illegible] n [illegible].

[illegible] $n^4 - (n-1)^4 = 4n^3 - 6n^2 + 4n - 1$ [illegible] S_n [illegible].

$\sum$.[illegible] (Sigma notation)

[illegible] ($\sum$.) [illegible].

1+2+3+ ....+n = $\sum n = \frac{n(n+1)}{2}$. $1^2+2^2+3^2+\ldots\ldots n^2 = \sum n^2 = \frac{n(n+10(2n+\ )}{6}$

$1^3+2^3+3^3+\ldots\ldots\ldots.+n^3 = \sum n^3 = \{\frac{n(n+1)^2}{2}\}$ [illegible]. [illegible] (i) [illegible] (5) [illegible]. [illegible] – $\sum n(n+1) = \sum(n^2+n) = \sum n^2 + \sum n$. $\sum(n+1)(n+2) = \sum(n^2+3n+2) = \sum n^2 + 3\sum n + \sum 2 = \sum n^2 + 3\sum n + 2n$.

[illegible]- 11.

1.2=2.3+3.4+.............+n (n+1) [illegible].

[illegible] – [illegible] $t_n = n(n+1)$, [illegible] n [illegible] = S_n .[illegible] $S_n = \sum t_n = \sum n(n+1) = \sum(n^2+n) = \sum n^2 + \sum n$

$= \frac{n(n+1)(2n+1)}{6} + \frac{n(n+1)}{2} = \frac{n(n+1)}{2}\left[\frac{2n+1}{3} + 1\right] = \frac{n(n+1)}{2} \cdot \frac{2(n+2)}{3} = \frac{1}{3}(n+1)(n+2)$. $\therefore S_n = \frac{n(n+1)(n+2)}{3}$ ([illegible]).

[illegible] – $\sum n^2$ [illegible] $\sum n$ [illegible].

[illegible]-12.

1.2.3+2.3.4+ 3.4.5+ ....[illegible] n [illegible].

[illegible] → [illegible] $t_n = n(n+1)(n+2) = n(n^2+3n+2)$ $= n^3+3n^2+2n$. ∵ $S_n = \sum t_n = \sum(n^3+3n^2+2n) = \sum n^3 + 3\sum n^2 + 2\sum n = \{\frac{n(n+1)}{2}\}^2 + 3.\frac{n(n+1)(2n+1)}{6} + 2\frac{n(n+1)}{2}$

[$\sum n^3, \sum n^2, \sum n$ [illegible].] $= \frac{\{n(n+1)\}^2}{4} + \frac{n(n+1)(2n+1)}{2} + n(n+1) = \frac{n(n+1)}{4}\{n(n+1) + 2(2n+1)+4\} = \frac{n(n+1)}{4}(n^2+n+4n+2+4) =$

$\frac{n(n+1)(n^2+5n+\ )}{4} = \frac{n(n+1)(n^2+2n+3n+6)}{4} =$

$\frac{n(n+1)\{n(n+2)+3(n+2)\}}{4} = \frac{n(n+1)(n+2)(n+3)}{4}$.

$\therefore\ S_n = \frac{n(n+1)(n+2)(n+3)}{4}$ ([illegible]).

[illegible]→ [illegible], S_n [illegible] $n = 10$ [illegible] S_{10} [illegible].

$S_{10} = \frac{10x11x12x13}{2} = 8580$ [illegible].

[illegible] – 13:

$1+(1+2)+(1+2+3)+(1+2+3+4)+$......... [illegible] n [illegible].

[illegible]: [illegible] n [illegible] $t_n =$ $(1+2+.........+n) = \frac{n(n+1)}{2} = \frac{1}{n}n^2 + \frac{n}{2}$

$\therefore = S_n = \sum t_n = \frac{1}{2}\sum n^2 + \frac{1}{2}\sum n = \frac{1}{2}\frac{n(n+1)(2n+1)}{6} + \frac{1}{2}\frac{n(n+1)}{2}$

$= \frac{1}{4}n(n+1)\left(\frac{2n+1}{3} + 1\right)$

$= \frac{1}{4}\frac{n(n+1)(2n+4)}{3} = \frac{1}{6} n (n+1)(n+2)$,

$\therefore S_n = \frac{n(n+1)(n+2)}{6}$ ([illegible]) .

[illegible]: 14

$1^3+3^3+5^3+7^3+$..............n [illegible]

[illegible].

[illegible] – [illegible] n [illegible]

t_n [illegible] $t_n = [1+(n-1)2]^2 = (2n-1)^2 = 4n^2 - 4n + 1$.

$\because S_n = \sum t_n = 4\sum n^2 - 4\sum n + \sum 1$

$= 4\frac{n(n+1)(2n+1)}{6} - 4\frac{n(n+1)}{2} + n = 2n(n+1)\left(\frac{2n+1}{3} - 1\right) + n$

$= \frac{2n(n+1).2(n-1)}{3} + n = \left\{\frac{4n(n^2-1)}{3} + n\right\} = n\left(\frac{(4n^2-4)}{3} + 1\right)$

$= \frac{n}{3}(4n^2-1)$

$\therefore S_n = \frac{n}{3}(4n^2-1)$ ([illegible])

[illegible] - 15.

1+3+6+10+15 ....(n [illegible]) [illegible]

[illegible].

[illegible] , [illegible] A.P. [illegible]

[illegible]

([illegible] 2,3,4,5,..[illegible]) A.P. [illegible].

$S_n = 1=3+6+10+15+.........=t_{n-1}t_n$ [illegible] S_n

$=1+3+.....=t_{n-2}+t_{n-1}+t_n$ [illegible].

[illegible] ,

$0 = 1+(3-1)+(6-3)+(10-6)+......+(t_n - t_{n-1}) - t_n$

$\therefore t_n = 1+2+3+...+n$ [illegible]

$\Rightarrow t_n = \frac{1}{2} n(n+1) = \frac{1}{2} n^2 + \frac{1}{2} n$. $S_n = \sum t_n = \frac{1}{2} \sum n^2 + \frac{1}{2} \sum n$

$= \frac{1}{2} \frac{n(n+1)(2n+1)}{6} + \frac{1}{2} \frac{n(n+1)}{2}$

$= \frac{1}{4} n(n+1) \{\frac{(2n+1)}{3} + 1\} = \frac{1}{4} \frac{n(n+1)(2n+4)}{3} =$

$\frac{1}{6} n(n+1)(n+2)$,

$\therefore S_n = \frac{1}{6} n(n+1)(n+2)$. ([illegible])

1.2 [illegible] (Arithmetic Mean):

[illegible] a [illegible] b [illegible] $x = \frac{a+b}{2}$ [illegible]

(a)__________x__________ (b)

A M B ([illegible] - 1.1)

$\overline{AB}$ [illegible] A [illegible] B [illegible] a [illegible] b (b> a)$\overline{AB}$ [illegible] M [illegible] $x = \frac{a+b}{2}$ ([illegible]) [illegible] a, $\frac{a+b}{2}$, [illegible] (A.P.) [illegible], $\frac{a+b}{2} - a = b - \frac{a+b}{2} = \frac{b-a}{2} = d$ ([illegible])

{ [illegible] $\overline{AB}$ [illegible] = b-a}

a. $\frac{a+b}{2}$, b A.P. [illegible] $\frac{a+b}{2}$ [illegible] a [illegible] b [illegible] A.M [illegible]

◇[illegible]

A.M. $= \frac{a+b}{2}$ ([illegible] a, $\frac{a+b}{2}$, b A.P. [illegible])

[illegible] 7 [illegible] 15 [illegible] A.M. $= \frac{7+15}{2} = \frac{22}{2} = 11$

[illegible] -1 [illegible] 10 [illegible] AM $= \frac{-1+10}{2} = 4.5$ [illegible].

1.4.1 ◇[illegible] a [illegible] b [illegible] AM [illegible].

(i) [illegible] a [illegible] b [illegible]. [illegible] AM [illegible] x_1 [illegible] x_2 [illegible]. [illegible] $\overline{AB}$ [illegible]. $\overline{AB}$ [illegible] $\frac{a+b}{2}$, a [illegible] b [illegible]. ◇[illegible] $\overline{AB}$ [illegible] $\frac{b-a}{3}$ [illegible] a, x_1,x_2, b [illegible] d [illegible]. [illegible] $d = \frac{b-a}{3}$. ([illegible] $\overline{AB}$ [illegible] = b-a), $\therefore$ x_1, $=a+d = a+\frac{b-a}{3} = \frac{2a+b}{3}$ [illegible]

(a)	x_1	x_2	(b)
A	P	Q	B

([illegible] 1.2)

$$X_2 = a+2d = a+2\left(\frac{b-a}{3}\right) = \frac{a+2b}{3}$$

[illegible] a [illegible] b [illegible] $x_1 = \frac{2a+b}{3}$, $x_2 = \frac{a+2b}{3}$ .... (iii)

(ii) [illegible] a [illegible] b [illegible] AM [illegible]. a [illegible] b [illegible], x_1, x_2,, x_3 [illegible]. [illegible] a, x_1, x_2, x_3, b [illegible]. X_1, x_2, [illegible] x_3 [illegible] a [illegible] b [illegible] $\overline{AB}$ [illegible] $d = \frac{b-a}{4}$. ([illegible] $\overline{AB}$ [illegible] = b –a)

(iii) (a) x_1 x_2 x_3 (b)

_________i_________i_________i__________

A T R S B

([illegible]-3.3)

$X_1=a+d =a+\frac{b-a}{4} =\frac{3a+b}{4}$, $x_2 = a+2d = a+ 2X\frac{b-a}{4} = \frac{a+b}{2}$ ar

$x_3= a+3d =a+3X\frac{b-a}{4} =\frac{a+3b}{4}$

[illegible] a [illegible] b [illegible] $\frac{3a+b}{4}$, $\frac{a+b}{2}$ [illegible] $\frac{a+3b}{4}$……….(iv)

(ii) [illegible] a [illegible] b [illegible] n [illegible] (AM) [illegible] $\overline{AB}$ [illegible] (n+1) [illegible]. [illegible] $= \frac{b-a}{n+1}$ [illegible]. [illegible], x_1, x_2, x_3,…..x_n [illegible] $x_1 = a+ \frac{b-a}{n+1}$, $x_2 = a+\frac{2(b-a)}{n+1}$, $x_3 = a+\frac{3(b-a)}{n+1}$…. $x_n = a+\frac{n(b-a)}{n+1}$ [illegible]. [illegible] a, x_1, x_2, x_3, ……….x_n , b [illegible] A.P [illegible]., [illegible] $d= \frac{b-a}{n+1}$ [illegible].

[illegible] - 16 : 2 [illegible] 62 [illegible] (i) [illegible] (ii) [illegible] (iii) [illegible] (iv) [illegible] AM [illegible]. [illegible]: [illegible] $a = 2$ [illegible] $b = 62$.

$\therefore$ b-a = 60

(i) [illegible] x_1 [illegible] $x_1 = a + \frac{b-a}{2}$

$= 2 + \frac{60}{2} = 2 + 30 = 32$

$\therefore$ 32, 2 [illegible] 62 [illegible].

(ii) [illegible] x_1 [illegible] x_2 [illegible] 2, x_1, x_2,, 62 [illegible] $d = \frac{b-a}{3} = \frac{60}{3} = 20$. [illegible] $x_1 = a+d = 2+20 = 22$ [illegible] $x_2 = a+2d = a+2X20 = 42$. [illegible] 22 [illegible] 42, 2 [illegible] 62 [illegible].

(iii) [illegible] $x_{,1}, x_2, x_3$, [illegible], 2, x_1, x_2, x_3, 62 [illegible] $d = \frac{b-a}{4} = \frac{60}{4} = 15$, $x_1 = a+d = 2+15 = 17$,

(iv) $x_2 = a+2d = 2+2X15 = 32$ [illegible] $x_3 = a+3d = 2+3X15 = 47$. [illegible] 17, 32, [illegible] 47,2 [illegible] 62 [illegible].

(v) [illegible] x_1, x_2, x_3 [illegible] x_4 [illegible] 2, x_1, x_2, x_3, x_4, 62 [illegible] AP [illegible] $d = \frac{b-a}{5} = \frac{60}{5} = 12$. [illegible]

$x_1 = a+d = 2+12 = 14$, $x_2 = a+2d = 2+2X12 = 26$, $x_3 = a+3d = 2+3X12 = 38$, $x_4 = a+4d = 2+4X12 = 50$

(vi) $\therefore$ 14, 24, 38, [illegible] 50, 2, [illegible] 62 [illegible]

[illegible].

[illegible] - 3 (b)

[illegible]. [illegible].

(a) $\frac{1}{15X16} = \ldots\ldots - \frac{1}{16}$ (b) $\frac{1}{12X\,11} = \frac{1}{11}\ \ldots\ldots.$

(c) $\frac{1}{n(n+1)} = \ldots\ldots - \frac{1}{n+1}$ (d) $\frac{1}{(n+1)n} = \frac{1}{n} - \ldots\ldots$

(e) 5 [illegible] 9 [illegible] …

(f) x [illegible] 7 [illegible] 5 [illegible] x = ………………

(g) (a+b) [illegible] (a- b) [illegible] …

(h) [illegible] AM 11, [illegible] 7 [illegible] …………

2. [illegible].

(a) $\frac{1}{1x2} + \frac{1}{2x3} + \frac{1}{3x4}$ ………20 [illegible]

(b) $\frac{1}{5x6} + \frac{1}{6x7} + \frac{1}{7x8}$ ……….16 [illegible]

3. (a) 7X15 + 8X20 +9X25 + ….[illegible] t_n [illegible].

(b) $6\sum n^2 + 4\sum n^2$ [illegible].

(c) 1x2 + 2x3 +3x4 +4x5……….+n (n+1) [illegible] S_n [illegible] S_{20} [illegible].

(d) 1x3 +2x4 +3x5…….[illegible] t_n, S_n [illegible] S_{10} [illegible].

4. [illegible] n [illegible]

(a) 1.1.+2.3.+3.5.+4.7+ …………

(b) 1.3+3.5+5.7+7.9+…………

(c) 3.8+6.11+9.14+…………………..

(d) 1+(1+3) + (1+3+5) +…………

(e) $1^2+4^2+7^2+10^2$ +………………

(f) $2^2+ 4^2 + 6^2 + 8^2$+……………………

(g) 1+5+12+22+35+………………..

(h) $1^2+ (1^2+2^2) + (1^2 +2^2 +3^2) + (1^2 +2^2 +3^2 +4^2)$+……………………

5. 15 [illegible] 27 [illegible] (i) [illegible] (ii) [illegible]

6. 12 [illegible] 36 [illegible] (i) [illegible] (ii) [illegible]

7. 6 [illegible] 46 [illegible] (i) [illegible] (ii) [illegible]

8. 5 [illegible] 65 [illegible] (i) [illegible] (ii) [illegible]

9. 11 [illegible] 71 [illegible]

10. 20 [illegible] 60 [illegible] n [illegible] AM [illegible] . [illegible] : [illegible] = 13 , [illegible]?

11. AP [illegible] 2 [illegible] 10 [illegible].

;;;;;;;;;;;

ᑌZꝁᒍT ᑫVEᒍ

OZTV

(Probability)

2.1. ᑫɛf ʃɤʃɤᐡɤ (introduction)

ᐃʃɜ 6ɤ ʃVɤ ɘz ɤɤɤ 6zɤV ᴑfʏɤ ɤɤVɤ ʃᐡʃ ɤɤɘʃɤ ʃɤɤʃ. ᐃzɤɤ ᴑfɤɤ (Experiment) ʃɤ ɤɤʃ ɤɤɤʏ ɤɤɤɘʟɤf (observation) ɘzɤ 6ɤ ɤɘzʏ 6ɤ ɘʟ6f ɘzɤ 6ɤ 6zɤV ᐡz ʃVɘʃ 6ɤ ɛzɘʃ zʏ 6ɤɤʏ ɘzVɤ ʃᐡʃ ɤʃ. ᐃzɤɤ 6ʏ ɤɤɤʏ 6zɤV (empirical probability) ɤɘ zᴑ ɤɤɘʃ ᐡz ɘzɤɤ VzɤɘL6 ᴑfɤɤɤ 6ɤ ɤɘzʏ ʃʏ ɘʃɤɤ ɤzᴑʃ ɤʃ , ɤɤɤɘɤɤ ʃɤ ᴑfɤɤ ᐡɤ ɤɤɘʃ 6ɤ ɤɘɤ6 ɤzᴑʃ ɤʃ. ∇ɤʃ ɘzz Vɤ ʃᐡʃ ɤʃ. ∇ɤʃ ɘz ɤɤɘʃ ʃɤ ɤzɘzɘ ɤzɘzɘ 6zɤV ɘz ɤɤɤʏ ɘfɘfɤV Vɤɤɘ ɘz ɤɘʃ ɘɤ ʃɤɤʃ.

ɤɤɤ ɘɤɛʃ ɤɤ ɘzɤz6zʏ zɤɜ 6zɤV (theoretical probability) ʃɤɘʃɤɤ ɤzzʏ ɤɘʃ ɘɤzʏ ɤzɘzɘ ɤzɘzɘ Vzzᐡ ɘz ɤɤɤʏ ɘfɤɤɤ ʃɤ ɘfɤ ʃɤɤ ɘzɤz6zʏ ɤɤɘʃ 6ɤ ɤɤʃ ɘzɤɤɤʏ 6zɤV ɤɤɘ ɘz ᴑʟ ɤ6z ɤʃ.

2.2 ᒍɤɘʃɤzʏ ʃɤ ɘzɤz6zʏ ɤɤɤʏ 6zɤV (Empirical and Theoritical Probanility):

Ozɤv ɤɤɤʏ ɘfɤɤɤ ɤɤɘʃ ᐡz ᴑfɤɤ (Experiments) ʃɤ ɤɤʃ ɤɤɤʏ ɤɤɤɘʟɤf

(Observation) ɘz ɤɤɘʃ ʃɤ ɤzᴑʃ ɤʃ. ᑫɤɤʏ ɘf ɤzᴑʃɤ 6ɤɤʏ ɤɤɤʏ 6zɤV ᐡz ɤfɤ ɤɘ ᐡɤɤzʏ ʃʏ. ∇ɤʃ ɘz ɤᴑɤɤ ɘʃɜ ᴑʃɤʃ Vʃ ɘzɤɤ Vɤ ɤ6ʟʃɤʃ.

[illegible] (Emperical) [illegible] 1 [illegible] (toss) [illegible] H [illegible] T [illegible] P(H) [illegible] P(T) [illegible] 0.5 [illegible] $\frac{1}{2}$ [illegible] 2 [illegible] (1,2,3,4,5 [illegible] 6) [illegible] 0.166 [illegible] $\frac{1}{6}$ [illegible] $\frac{1}{2}$ [illegible] $\frac{1}{6}$ [illegible] = $\frac{\text{Frequency of the results}}{\text{No of Experiments}}$ [illegible]

[illegible] -1-

[illegible] 20 [illegible] 7 [illegible] T [illegible] P(T) [illegible] P(H) [illegible]

[illegible] 20 [illegible] 7 [illegible] T [illegible] H [illegible] 13 [illegible]. $P(T) = \frac{\text{Frequency of the T}}{\text{No of toss}} = \frac{7}{20}$ [illegible] $P(H) = \frac{\text{Frequency of the H}}{\text{No of toss}} = \frac{13}{20}$.

[illegible] -2-

[illegible] 30 [illegible] 1 [illegible] 2 [illegible] 4 [illegible] , [illegible] 3 , 4 [illegible] 5 [illegible] P(6) [illegible].

[illegible] – [illegible]

1 [illegible] (frequency) =4 2 [illegible] =4

3 [illegible] = 5, 4 [illegible] =5 [illegible]

5 [illegible] =5.

[illegible] 6 [illegible] = 30 7–(4+4+5+5+5) =7.

$$P(6) = \frac{\text{Frequency of the 6}}{\text{Totol drop of the luddu}} = \frac{7}{30}.$$

[illegible]-3

[illegible] 15 [illegible]. [illegible] 5 [illegible] , [illegible] (opposite) [illegible] ?

[illegible] – [illegible] E [illegible]. [illegible] E [illegible]

$$= 15\text{-}5 = 10. \quad P(E) = \frac{\text{Frequency of the E}}{\text{Total no of Score}} = \frac{10}{15} = \frac{2}{3}.$$

[illegible]- 4

[illegible].

P([illegible]) $= \frac{1}{4}$, P ([illegible]) $= \frac{1}{8}$, P ([illegible]) $= \frac{1}{2}$ [illegible] P ([illegible]) $= \frac{1}{8}$. [illegible] 4000 [illegible] ?

[illegible] – [illegible] x, y, z, [illegible] w [illegible].
[illegible] $n = x = y+z+w = 4000$.
[illegible] $\frac{x}{n} = \frac{1}{4}$, $\frac{y}{n} = \frac{1}{8}$, $\frac{z}{n} = \frac{1}{2}$ [illegible] $\frac{w}{n} = \frac{1}{8}$ [illegible] $\frac{x}{4000} = \frac{1}{4}$, $\frac{y}{4000} = \frac{1}{8}$, $\frac{z}{4000} = \frac{1}{2}$ [illegible] $\frac{w}{4000} = \frac{1}{8}$. $X = \frac{4000}{4} = 1000$, $Y = \frac{4000}{8}$ 500, $Z = \frac{4000}{2} = 2000$ [illegible] $W = \frac{4000}{8} = 500$.

[illegible] 1000 [illegible], 500 [illegible], 2000 [illegible] 500 [illegible].

[illegible] –

1. [illegible] 8 [illegible] (Natural scientist) Cote de buffon [illegible] 4040 [illegible] H, 2048 [illegible]. [illegible] H [illegible] $= \frac{2048}{4040} = 0.507$.

2. [illegible] J.E. Kerrich 100000 [illegible] 5067 [illegible] H [illegible]. [illegible] H [illegible] $\frac{5067}{10000} =$ 0. 5067

[illegible] Karl Pearson 24000 [illegible] 12012 [illegible] H [illegible] H [illegible] $=\frac{12012}{24000}=0.5005$ [illegible] H [illegible].

[illegible] H [illegible] 0. 5 [illegible] $\frac{1}{2}$ [illegible] $=\frac{1}{6}$ [illegible] (theoritical) [illegible].

[illegible] - Theoretical Probability [illegible] Classical probability [illegible].

[illegible] -5-

[illegible] 4 [illegible]

[illegible] (favourable) [illegible] 1, 2 [illegible] 3 .

[illegible] =6

[illegible] =

$$\frac{\text{No.of favourable results}}{\text{Total probability results of of observation}}=\frac{3}{6}=\frac{1}{2}.$$

[illegible] (theoretical or classical probability) [illegible].

[illegible] – 6

[illegible], [illegible]. E[illegible], [illegible].

[illegible] – [illegible] Y [illegible], [illegible] 1. [illegible] B [illegible] R [illegible].

[illegible] = 3 [illegible] Y [illegible] =1. ∴ $P(Y) = \frac{1}{3}$. [illegible]

$P(B) = \frac{1}{3}$ [illegible] $P(R) = \frac{1}{3}$

[illegible] – (i) $P(Y) + P(B) + P(R) = \frac{1}{3} + \frac{1}{3} + \frac{1}{3} = 1$. [illegible] (Elementary Events) [illegible]. [illegible] Y, B [illegible] R [illegible] 1 [illegible], [illegible].

[illegible] – [illegible] 1 [illegible].

[illegible] – [illegible]

[illegible] (i) 4 [illegible] (ii) 4 [illegible] 4 [illegible].

[illegible] – [illegible] $E = 4$ [illegible] 1,2,3,4,5 [illegible] 6 [illegible] =6. [illegible] E [illegible] =5 [illegible] 6 [illegible] 2. $\therefore\ P(E) = \frac{2}{6} = \frac{1}{3}$

(ii) [illegible] $F = 4$ [illegible] 4 [illegible] 1,2,3,4,5 [illegible] 6 [illegible] 6. [illegible] F [illegible] 1,2,3, [illegible] 4 [illegible] 4.

$\therefore\ P(F) = \frac{4}{6} = \frac{2}{3}$. [illegible] $P(E) + P(F) = 1$.....(i)

[illegible] –

(i) [illegible] E [illegible] F [illegible]. [illegible] $E = 4$ [illegible] $F = 4$ [illegible]. 4 [illegible] $\bar{E}$ [illegible] E [illegible], [illegible] $P(\bar{E}) = P(F)$.

$\therefore\ P(E) + P(\bar{E}) = 1$ (i) [illegible] $\Rightarrow P(\bar{E}) = 1 - P(E)$.

[illegible] – [illegible] E [illegible] $P(\bar{E}) = 1 - P(E)$.

(2) [illegible] $\bar{E}$ [illegible] E [illegible]. [illegible] E [illegible] $\bar{E}$ [illegible] E [illegible].

[illegible] - 8

[illegible] (H) [illegible].

[illegible] HH, HT, TH, [illegible] TT [illegible] 4 [illegible].

[illegible] E [illegible] H [illegible] HH,HT, TH [illegible] $=3$. $\therefore P(E) = \frac{3}{4}$. [illegible] H [illegible] $= \frac{3}{4}$.

[illegible] $P(E) = 1 - P(\bar{E}) = 1 - \frac{1}{4} = \frac{3}{4}$

([illegible] $P(\bar{E})$ = [illegible] H [illegible] $= \frac{1}{4}$)

. [illegible] H [illegible] H [illegible].

[illegible] - 4 (a)

1. (i) [illegible] 8 [illegible] ?

   (ii) [illegible] 7 [illegible] ?

   (iii) [illegible] ≤ 3 [illegible].

   (iv) [illegible] 0.62 [illegible].

   [illegible] T [illegible].

   (vi) [illegible].

   (vii) $P(E) = 0.05$ [illegible], $P(\bar{E})$ [illegible].

2. [illegible] 30 [illegible] 16 [illegible] H [illegible], [illegible] P(H) [illegible] P(T) [illegible].

3. [illegible] 30 [illegible] H [illegible] T [illegible], [illegible] P(H) [illegible] P(T) [illegible].

4. [illegible] 30 [illegible] 4 [illegible] 1 [illegible] 5 [illegible] 2, 6 [illegible] 3, 7 [illegible] 4, 8 [illegible] 5 [illegible], [illegible] 6 [illegible].

5. [illegible] 8 [illegible]

6. [illegible] 100 [illegible] 10 [illegible], 15 [illegible], 50 [illegible](fail) [illegible]

7. 40 [illegible], [illegible] 15 [illegible], 10 [illegible]

8. [illegible] 3 [illegible], [illegible] 4 [illegible](marble) [illegible]

   (i) [illegible]

   (ii) [illegible]

   (iii) [illegible]

9. [illegible] 5 [illegible], 4 [illegible] 3 [illegible](footbal) [illegible]

   (i) [illegible]

   (ii) [illegible]

   (iii) [illegible]

10. [illegible] 60 [illegible](electric) [illegible].

[illegible] 12 [illegible].

[illegible]

(i) [illegible].

(ii) [illegible].

3.3. [illegible](set) [illegible]

[illegible] H [illegible] T [illegible] S [illegible] S= (H,T) ....(i)

[illegible] 1,2,3,4,5,6 [illegible] S = (1,2,3,4,5,6) …….(ii)

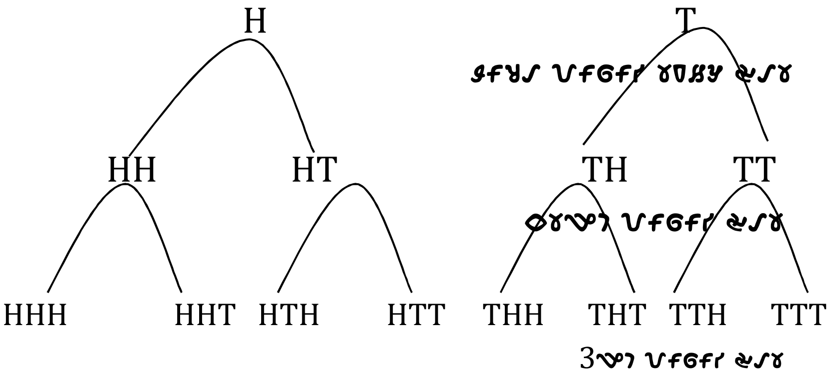
[illegible] sample space S = (HH,HT, TH,TT)…….(iii).

([illegible] HT [illegible] H [illegible] T [illegible]), [illegible] sample space [illegible].

S= (11,12,13,14,15,16
21,22,23,24,25,26
31,32,33,34,35,36
41,42,43,44,45,46
51,52,53,54,55,56,
61,62,63,64,65,66).......(iv)

(i) [illegible] (iii) [illegible] n [illegible] $=2^n$ [illegible] (ii) [illegible] (iv) [illegible] n [illegible] $= 6^n$ [illegible].

([illegible] [illegible], [illegible], [illegible].



[illegible] H [illegible] T [illegible]. [illegible] 8 [illegible].

S = (HHH,HHT,HTH,HTT,THH,THT,TTH,TTT) [illegible] 3[illegible] sample space [illegible].

4.3.1 [illegible] (Event) -

[illegible] sample space S [illegible] E [illegible] sample space [illegible] S =(HH,Ht,TH,TT)

[illegible] E [illegible] T [illegible] S [illegible] HT,TH,TT [illegible] E [illegible] S = (HT,TH,TT) . [illegible] T [illegible] E [illegible]

[illegible] - 9

[illegible]

(i) E [illegible] ≤ 3 (ii) E_2: [illegible] = 9 (iii) E, : [illegible] = 13

(ii) [illegible] sample space 30 [illegible]

[4.3 [illegible] (iv)] [illegible]

(i) [illegible] E,: [illegible] ≤ 3 [illegible] 12,21, 11. $\therefore$ $E_1 = \{12,21,11\}$

(ii) [illegible] E_2 : [illegible] 9 [illegible] 63,36,45, ar 54. $\therefore$ $E_2 = \{63,36,45,54\}$

(iii) [illegible] E_3: [illegible] 13 [illegible] $\therefore$ $E_3 = \emptyset$

([illegible] $\varnothing$ [illegible]). [illegible]. [illegible] S saple space [illegible] E [illegible] $E \subset S$ [illegible].

(i)[illegible] (simple or element event) [illegible] (H) [illegible] (T) [illegible] (HH), (HT), (TH), [illegible] (TT) [illegible].

(ii) [illegible] (Compound events)-[illegible] (TH,HH,HT) (HH,TT) [illegible] S= (TH, TT, HH, HT) [illegible].

(iii)[illegible] (Mutually exclusive events) [illegible] E_1 [illegible] E_2 ([illegible] E_1 [illegible] $E_2 \subset S$) [illegible] E_1 [illegible] E_2 [illegible] $E_1 \cap E_2 = \phi$ ([illegible] (H) [illegible] (T) [illegible] (HH,TH) [illegible] (TT) [illegible],

(iv) [illegible] (Complementary Events)

E_1 [illegible] E_2 [illegible] E_1 [illegible] E_2 [illegible] $(E_1 \cup E_2)$ [illegible] saple space S [illegible]. [illegible] $E_1 = (H)$ [illegible] $E_2 = (T)$ [illegible]. [illegible] $E_1 = (HH)$, $E_2 = (HT, TH, TT)$ [illegible].

4.3.2 [illegible] –

[illegible] E [illegible] S [illegible] sample space [illegible], E [illegible] P(E) [illegible].

$$P(E) = \frac{\text{Number of elements of the E}}{\text{Number of elements of the S}} = \frac{|E|}{|S|}$$

. [illegible] S [illegible] E [illegible] (|E|) [illegible] S [illegible] (|S|) [illegible] E [illegible]. [illegible] – [illegible] S = (H,T) [illegible] sample space [illegible]. [illegible] |S| = 2 [illegible] S [illegible]. [illegible] E_1, E_2, E_3, E_4 [illegible]. E_1 = H [illegible] = (H), E_2 = T [illegible] = (T). E_2 = H [illegible] T [illegible] = (H_2T) [illegible] E_4 = H [illegible] T [illegible] = ϕ [illegible]. $\therefore |E_1| = 1, |E_2| = 2, |E_3| = 2, |E_4| = 1$ [illegible].

$P(E_1) = \frac{|E1|}{|S|} = \frac{1}{2}$. $P(E_2) = \frac{|E2|}{|S|} = \frac{1}{2}$. $P(E_3) = \frac{|E3|}{|S|} = \frac{2}{2} = 1$ [illegible] $P(E_4) = \frac{|E4|}{|S|} = \frac{0}{2} = 0$

4.3.3 [illegible]-

(i) $E \subset S$ [illegible] $P(\phi) = o$, $P(S) = 1$, [illegible] $0 \leq P(E) \leq 1$ [illegible]. ϕ [illegible] S [illegible].

(ii) [illegible] (E) [illegible] ($\bar{E}$ [illegible] E') [illegible] S [illegible]. [illegible] 1. [illegible] $P(E) + P(E') = 1$

(iii) E_1 [illegible] E_2 [illegible], [illegible] $E_1 \subset S$ [illegible] $E2 \subset S$ [illegible] $E_1 \cup E_2$ [illegible]. $\because E_1 \cup E_2$ sample space S [illegible]. [illegible] -

$|E_1 \cup E_2| = |E_1| + |E_2| - |E_1| \cap |E_2|$. ([illegible] E_1 [illegible] E_2 [illegible]).

[illegible] $P(E_1 \cup E_2) = \frac{|E2 \cup E2|}{|S|} = \frac{|E2| + |E2| - |E1 \cap |E2|}{|S|} = \frac{|E1|}{|S|} + \frac{|E2|}{|S|} - \frac{|E1| \cap |E2|}{|S|} = P(E_1) + P(E_2) - P(E_1 \cap E_2)$.

[illegible]

$P(E_1 \cup E_2 = P(E_1) + P(E_2) - P(E_1 \cap E_2)$

[illegible] : (i) [illegible] E_1 [illegible] E_2 [illegible] -

(ii) E_1 ᱟᱨ E_2 [illegible] (non mutually exclusive)

(iii) E_1 ᱟᱨ E_2 [illegible] $E_1 \cap E_2 = \phi$ [illegible], [illegible] $P(E_1 \cap E_2)$ 0 ᱟᱨ [illegible]

$$P(E_1 \cup E_2) = P(E_1) + P(E_2)$$

[illegible] -

> E_1 ᱟᱨ E_2 [illegible] $P(E_1 \cup E_2) = P(E_1) + P(E_2) - P(E_1 \cap E_2)$ [illegible] E_1 ᱟᱨ E_2 [illegible] $P(E_1 \cup E_2) = P(E_1) + P(E_2)$.

[illegible]-10.

[illegible]. [illegible] E [illegible] H ᱟᱨ T [illegible], [illegible] E [illegible].

[illegible] sample space [illegible]. [illegible] S = (HH,HT, TH,TT) . ∴ |S| =4. [illegible] E [illegible] TH, ᱟᱨ HT. ∴ E = (TH, HT) ar |E| =2

[illegible] $P(E) = \frac{|E|}{|S|} = \frac{3}{4} = \frac{1}{2}$.

[illegible]-11

[illegible] E [illegible] T [illegible],
[illegible]

[illegible] S = (HH,TH, HT, TT) [illegible]
|S| =4

E [illegible] TH,HT [illegible] TT [illegible]. ∴ |E| =3.

[illegible] $P(E) = \frac{|E|}{|S|} = \frac{3}{4}$.

[illegible] -12.

[illegible] ≥ 11 [illegible]

[illegible] sample space S [illegible] $|S| = =6^2 =36$. [illegible] 36 [illegible] E [illegible] 56,65,66 [illegible] |E| =3

∴ [illegible] $P(E) = \frac{|E|}{|S|} = \frac{3}{36} = \frac{1}{12}$. ([illegible]).

[illegible]-13.

[illegible]

[illegible] sample space [illegible] S = (1,2,3,4,5,6)

[illegible] E_1 = [illegible] E_2 = [illegible].

[illegible] E_1 [illegible] E_2 [illegible] S [illegible]. [illegible] $E_1 = (2,4,6)$ [illegible] $E_2 = (1,3,5)$.

$\therefore$ $|S| = 6$, $|E_1| = 3$, $|E_2| = 3$. [illegible].

$\therefore$ [illegible] =

$P(E_1 \cup E_2) = P(E_1) + P(E_2)$

$= \frac{|E1|}{|S|} + \frac{|E2|}{|S|} = \frac{3}{6} + \frac{3}{6} = \frac{1}{2} + \frac{1}{2} = 1$ ([illegible])

[illegible] - 14.

[illegible] ≥ 4 [illegible].

[illegible] - [illegible] sample space S = (1,2,3,4,5,6)

[illegible] E_1 (2,4,6) [illegible] ≥ 4 [illegible] $E_2 = (4,5.6)$

$\therefore$ $|E_1| = 3$, $|E_2| = 3$. $|E_1|$ [illegible] $|E_2|$ [illegible]. [illegible] $E_1 \cap E_2 = (4,6) \Rightarrow |E_1 \cap E_2| = 2$. [illegible] ≥ 4 [illegible] $= P(E_1 \cup E_2) = P(E_1) + P(E_2) - P(E_1 \cap E_2) = \frac{|E1|}{|S|} + \frac{|E2|}{|S|} - \frac{|E1 \cap E2|}{|S|} = \frac{3}{6} + \frac{3}{6} - \frac{2}{6}$

$= \frac{4}{6} = \frac{2}{3}$.

[illegible]: $E_1 \cup E_2 = (2,4,6) \cup (4,5,6) = (2,4,5.6) \Rightarrow |E_1 \cup E_2| = 4$

[illegible] [illegible] (LHS)= $P(E_1 \cup E_2) = \frac{|E1 \cup E2|}{|S|} = \frac{4}{6} = \frac{2}{3}$.

[illegible] [illegible] [illegible] = $P(E_1) + P(E_2) - P(E_1 \cap E_2) = \frac{2}{3}$ ([illegible] [illegible] [illegible] [illegible] [illegible])

$\therefore$ $P(E_1 \cup E_2 0 = P(E_1) + P(E_2) - P(E_1 \cap E_2\ )$ ([illegible] [illegible])

[illegible] -4 (b)

1. [illegible]

   (i) [illegible] φ [illegible] (0) [illegible].

   (ii) [illegible] E = S, [illegible] S (sample space) , [illegible] $P(E) \leq 1$.

   (iii) [illegible] sample space [illegible] 4 [illegible].

   (iv) Probability [illegible] 'i' [illegible] $\frac{2}{11}$.

   (v) [illegible] sample space [illegible] 36.

   (vi) [illegible] 3 [illegible] sample space [illegible] 3^2 =9.

   (vii) Mathematics [illegible].

   (viii) [illegible] sample space [illegible] E_1 [illegible] E_2 [illegible].

   (ix) [illegible] E_1 = H [illegible] E_2 = (H,T)

2. [illegible] E_1, E_2, E_3 [illegible] E_4 [illegible] $(E_1 \cup E_2 \cup E_3 \cup E_4)$ [illegible]

3. [illegible] (i) [illegible] ≤ 3 (ii) [illegible] < 3 (iii) [illegible] ≤ 4 (Iv) [illegible] <6 (v) [illegible] ≤ 6 (vi) [illegible] ≥ 6.

4. SCHOOL [illegible] S [illegible]

5. [illegible] 5 [illegible] 6 [illegible] 4 [illegible]

6. [illegible] E [illegible] E [illegible] E [illegible]

7. [illegible]

8. [illegible] E [illegible] ≤ 5 [illegible] E [illegible]

9. [illegible]

(i) [illegible] H.

(ii) [illegible] T [illegible]

(iii) [illegible] H [illegible]

(iv) [illegible] H [illegible]

10. [illegible] 3 [illegible]. Sample space [illegible].

(i) [illegible] T [illegible].

(ii) [illegible] H [illegible].

(iii) [illegible] T [illegible].

(iv) [illegible] H [illegible] T [illegible]

(v) [illegible] T [illegible].

11. [illegible].

(i) [illegible] = 6

(ii) [illegible] = 4

(iii) [illegible],

(iv) [illegible] ≥ 10

(v) [illegible] < 6

(vi) [illegible] 6.

12. [illegible] E_1 [illegible] E_2 [illegible] $P(E_1) = 2P(E_2)$ [illegible] $P(E_1) + P(E_2) = 0.9$. $\therefore E_1 \cup E_2$ [illegible] E_1 [illegible].

13. [illegible] E_1 [illegible] E_2 [illegible] $P(E_1) = \frac{5}{8}$ [illegible] $P(E_2) = \frac{2}{8}$ [illegible] $P(E_1 \cap E_2) = \frac{1}{8}$ [illegible].

(i) $P(E_1 \cup E_2)$ (ii) $P(E_1)$ (iii) $P(E_2)$

(iv) $P(E_1 \cup E_2)$

14. MATHEMATICS [illegible] A [illegible] T [illegible].

15. [illegible] 5 [illegible].

16. [illegible] ≥ 3 [illegible].

::::::::::::::::::::

[illegible]

[illegible]

(Statistics)

3.1 [illegible] (introduction) -

[illegible] data [illegible]. [illegible] data (numerical data), [illegible] data(primary data), [illegible] data (Secondary data) [illegible] data(Secondary data) [illegible] data [illegible] (Frequency distribution table) [illegible] (Frequency polygon) [illegible] (histogram), [illegible] (Pie-chart) [illegible] (Pictograph) [illegible] data [illegible] data [illegible] data [illegible].

[illegible] (Central Tendency) -

[illegible] data [illegible]. [illegible] data [illegible]. [illegible] data [illegible].

	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible] data [illegible] data [illegible] data [illegible] (Mean [illegible] Average) [illegible]

[illegible] $= \frac{\text{total number}}{\text{total subject}} = \frac{385}{5} = 77.0$

[illegible] $= \frac{\text{total number}}{\text{total subject}} = \frac{386}{5} = 77.2$

[illegible]

[illegible] (i) [illegible] (Mean)(ii) [illegible](Median) (iii) [illegible](Mode) [illegible].

[illegible] – [illegible] data [illegible] data [illegible].

[illegible] – [illegible].

[illegible] – [illegible] data [illegible] data [illegible].

[illegible] (Mean) –

(a) Data [illegible] (Mean of the Individual Series) –

[illegible] data [illegible] $x_1, x_2, x_3 \ldots\ldots x_n$ [illegible], [illegible] data [illegible] M [illegible]. $M = \frac{x1+x2+x3\ldots+Xn}{n} = \frac{1}{n}\sum_{k=1}^{k=n} X_k$ [illegible] M [illegible], $\sum$ (Sigma) [illegible], x: data [illegible] $\sum_{k=1}^{k=n} x_k$: x_1 [illegible] x_n [illegible] n : data [illegible] data [illegible] $=\frac{\text{Agrigets of data}}{\text{Number of data}}$ [illegible] $M = \frac{\sum x}{n}$.

[illegible] -1 –

[illegible] 65, 67, 85, 78, 69, 78. [illegible] data [illegible]?

[illegible]- $M = \frac{\sum x}{n}$ ([illegible] $\sum x$ = data [illegible] (n = [illegible])= $\frac{1}{6}$ (65+67+85+78+69+78)= $\frac{1}{6}$ X 442 = 73.67

(b)[illegible] data [illegible] (Mean of a frequency distribution))

[illegible] data [illegible].

[illegible]-2

[illegible], [illegible].

[illegible] – A

[illegible] ([illegible]) x :	69	70	71	72	73
[illegible] f:	4	2	3	2	1

[illegible] –

[illegible]- A

([illegible]) x	[illegible] (f)	[illegible] X [illegible] (fx)
69	4	276
71	2	140
72	3	213
73	2	73
	$\sum f$=12	$\sum fx$ =846

[illegible] $M = \frac{\sum fx}{\sum f} = \frac{846}{12} = 70.5$ [illegible]

[illegible] (short –cut- Method) –

[illegible] (Deviation Method) [illegible]

93, 98, 112, 103, 97, 109 [illegible] =

$\frac{1}{6}$(93 + 98 + 112 + 103 + 97 + 109

= $\frac{1}{6}$ { (100-7) + (100 -2) +(100 + 12) + (100 + 3) + (!00- 3) + (100 +9)}

= $\frac{1}{6}$ [6 X 100 + { (-7) + (-2) +12 +3 +(-3) +9}]

= $\frac{1}{6}$ x 6 x 100 + $\frac{1}{6}$ x 12 = 100 + $\frac{12}{6}$.

[illegible] 100 [illegible] 100 [illegible] 100 [illegible] (Working zero) [illegible] (x) [illegible] = -7, -2, 12, 3, -3, 9 [illegible]

[illegible] = (-7) + (-2) + 12 +3 +(-3) +9 =12

∴ [illegible]

(M) = [illegible] + $\frac{\text{To tal deviation}}{\text{Total Numbers}}$

[illegible]- 100 [illegible]

[illegible]-3

[illegible] A [illegible] data [illegible]

[illegible]- [illegible]- A

[illegible] ([illegible].)x	[illegible] (f)	[illegible] (y) [illegible] 70	[illegible] X [illegible](fy)
69	4	-1	-4
70	2	0	0
71	3	1	3
72	2	2	4
73	1	3	3
	$\sum f = 12$		$\sum fy = 6$

[illegible] M = [illegible] + $\frac{\sum fy}{\sum f}$ = 70 + $\frac{6}{12}$ = 70 + 0.5 =70.5 ([illegible]).

([illegible]) [illegible] (Mean of a grouped frequency distribution)-[illegible] (y) [illegible] (f)[illegible] (fy) [illegible] ($\sum fy$) [illegible] ($\sum f$) [illegible] (M) = $\frac{\sum fy}{\sum f}$ [illegible] data [illegible]

[illegible] - 4.

[illegible] 100 [illegible]

([illegible]) [illegible] x [illegible] f [illegible])

[illegible] - B

(x)	0-10	10-20	20-30	30-40	40-50	50-60	60-70
(f)	1	7	24	36	25	6	1

[illegible] $y = \frac{t1+t2}{2}$ ([illegible] t_1 [illegible] t_2 [illegible]) [illegible] fy [illegible] $\sum fy$ [illegible].

[illegible] -

[illegible] – B

[illegible]	[illegible] (f)	[illegible] ($y= \frac{t1+t2}{2}$)	[illegible] X [illegible]
0-10	1	5	5
10-20	7	15	105
20-30	24	25	600
30-40	36	35	1260
40-50	25	45	1125
50-60	6	55	330
60-70	1	65	65
	$\sum f$ 100		$\sum fy$ =3490

Oǝɾ ɛƨϑɾ $M = \frac{\sum fy}{\sum f} = \frac{3490}{100} = 34.9$ (ɷ٩ʅǝ)

ᑲ٦LLꓡL◇ – 5:

Uƽɾ – B ɤʊ ȷʊ٩ʅɣ data ɤʊȣɣ ϭǝɾ ɛƨϑɾ, ʊɩʊɣ ϭLƽɣ ϑƨ ɟ٧f ϑϭʊ ɩLɩLϑɾ ○ƨɷɤ ϑf ɷfϑfɤ ○ƨɷɤ ǝʊϑɾ ϭʊ ɞɾɤfǝ ȷLǝfɟ Vʊ.

ꓘɾɤfǝ ȷLǝf– ٦ʊ٩ʅϭɣ ٧ƨ 35 ʊɩʊɣ ϭLƽɣ(A) ǝʊϑɾ ϭʊ ɟ٧fȣƨɣ ϑɾ.

Uƽɾ – B_2

◇ƨɤ ɟϭɾ	٦ʊʊ ϑ٩ʅʊ (f)	◇ƨɤ ɟϭɾ ɤʊȣɣ ʊɩʊɣ ϭLƽɣ (x)	Ʊfϑfɤ (y) = x-A	٦ʊʊ ϑ٩ʅʊ X ɷfϑfɤ(fy)
0-10	1	5	-30	-30
10-20	7	15	-20	-140
20-30	24	25	-10	-240
30-40	36	35	0	0
40-50	25	45	10	250
50-60	6	55	20	120
60-70	1	65	30	30
	$\sum f$ 100			$\sum fy$=-10

∴ Oǝɾ ɛƨϑɾ (M) $= A + \frac{\sum fy}{\sum f} = =35 + \frac{-10}{100} = 35 - 0.1 = 34.9$

ꓘfɴf – Ʊfϑfɤ ǝʊϑɾ ϭʊ (Step-Deviation Method):

٦ʊ٩ʅ ○ƨɷɤ ǝʊϑɾ ϭʊ ٧ƨ ʊɞL ɞ٧ȣ ɾɤ ɩLɩLϑɾ ɲʊ ǝʊϑɾƨɣ ○ƨɷɤ ϭ٩ʅɾ. Ɉȣɾɤɣ ɩLɩLϑɾ ○ƨɷɤ ǝʊϑɾ ɲʊ ٩ʅʊ٩ʅ ○ƨɷɤ ɤʊȣƨ ɲʊ ʊɩʊɣ ϭLƽɣ ɾɤ ʊ٩ʅ ɷfϑfɤ ϑƨ ɤʊȣɣ ɲƨɤƨɛƨ ɷLɛLɣ ɲʊȣɾ. ∇٩ʅ ɷfϑfɤ ϑƨɤʊ ȷʊ٩ʅɣ ɞ٧ȣ ɣɷɤƨɣ ɾVϑɾ ϑƨ ϭʊ ɷfϑfɤ ϑʊ ɷɾɩfɜ ϑʊʊ ϭʊ ٩ʅʊ٩ʅ ○ƨɷɤ ǝʊϑɾ ϭʊ ɞɾɤfǝ ȷLǝf ٩ʅɾ.

[illegible] (M) = A + $\frac{\sum fy}{\sum f}$ X c. (A) = [illegible] ,

Y = [illegible] (deviation)

[illegible]

$\sum fy$ = [illegible] (f) [illegible] y [illegible]

[illegible] – 6:

[illegible] data [illegible]

[illegible] –C

[illegible] (x)	5	10	15	20	25
[illegible] (f)	3	4	5	2	1

[illegible] –

x	f	x-A=y (A=15)	C= 5 Y=$\frac{y}{5}$	fy	
5	-10	3	-2	-6	
10	-5	4	-1	-4	
15	0	5	0	0	
20	5	2	1	2	
25	10	1	2	2	
	$\sum f$ =15			$\sum fy$ = - 6	

M = A + $\frac{\sum fy}{\sum f}$ X c = !5 + $\frac{-6}{15}$ X 5 = 15 + (-2) =13.

[illegible] (x-A) [illegible] 5 . [illegible] 5 [illegible].

[illegible] - 7:

[illegible] –B [illegible] data [illegible].

[illegible] - B3

[illegible] 35 [illegible] (A) [illegible].

[illegible]	[illegible] (f)	[illegible]	[illegible] Y= x-A (A=35)	[illegible] (Y) [illegible]	fy
0-10	1	5	-30	-3	-3
10-20	7	15	-20	-2	-14
20-30	24	25	-10	-1	-24
30-40	36	35	0	0	0
40-50	25	45	10	1	25
50-60	6	55	20	2	12
60-70	1	65	30	3	3
	$\sum f = 100$				$\sum fy$ =-1

$\therefore$ [illegible] (M)=A+ $\frac{\sum fy}{\sum f}$ X i=35 +$\frac{-1}{100}$X 10 = 35- 0.1

= 34.9

(I = [illegible] . [illegible] 10 [illegible]). [illegible]. [illegible] 35 [illegible] ([illegible]) [illegible]. 25 [illegible].

[illegible]– $x_1, x_2, x_3 \ldots\ldots x_n$ [illegible] M [illegible] $\sum_{i=1}^{n}(x_1 - M) = 0$

[illegible] data. [illegible] 8 [illegible] data (Some useful results on Mean); x_1, x_2, $x_x \ldots\ldots\ldots x_x$ [illegible] M [illegible]

(i) X_1+A, x_2+A, $x_3+A \ldots x_n+A$ [illegible] $M+a$ [illegible].

(ii) X_1-a, x_2-a, $x_3-a \ldots. x_n-a$ [illegible] $M-a$ [illegible].

(iii) ax, ax_2, $ax_3 \ldots.. ax_n$ [illegible] aM [illegible] $a \neq 0$.

(iv) $\frac{x1}{a}, \frac{x2}{a}, \frac{x3}{a} \ldots. \frac{xn}{a}$ [illegible] $\frac{M}{a}$ [illegible]. [illegible] $a \neq 0$

[illegible]-8:

$x_1, x_2, x_3 \ldots\ldots x_n$ [illegible] M [illegible] $\sum_{i=1}^{n}(X_1\text{-}M)=0$

[illegible]: $M=\frac{x1+x2+x3 \ldots.+xn}{n} \Rightarrow x_1+x_2+x_3 \ldots..+x_n= n.M.$

[illegible] $\sum_{i=1}^{n}(x_i\text{-}M)= (x_1\text{-}M)+ (x_2\text{-}M)+ (x_3\text{-}M) \ldots.+ (x_n\text{-}M)= (x_1+x_2+x_3 \ldots+x_n)\text{-}(M+M+M \ldots n$ fy$)= x_1+x_2+x_3 \ldots.+x_n)\text{-}n.M=n.M\text{-} n.M=0$ ([illegible])

[illegible]-9

$x_1, x_2, x_3 \ldots\ldots\ldots$ [illegible] n [illegible] M

[illegible] $\sum_{i=1}^{n}(x_i -12)=-10$ [illegible] $\sum_{i=1}^{n}(x_i\text{-}3) =62$ [illegible] n [illegible] M [illegible].

[illegible]-$\sum_{i=1}^{n}(x_i -12)=-10 \Rightarrow (x_1\text{-}12)+ (x_2\text{-}12) + (x_3\text{-}12) \ldots..+ (x_n\text{-}12)= -10 \Rightarrow (x_1+x_2+x_3 \ldots\ldots+x_n) -12n =- 10 \Rightarrow nM -12n =- 10 \ldots(i)$ $[\because \frac{x1+x2+x3 \ldots.+xn}{n} =M]$.

[illegible] $\sum_{i=1}^{n}(x_i \text{-}3) =62 \Rightarrow nM -3n =62 \ldots..(ii)$

(i)[illegible] (ii) [illegible] _9n = -72 ⇒ n=8 n [illegible] (i) [illegible] 8M -12 X 8 =-10 =86⇒M $=\frac{86}{8}$ =10.75([illegible])

[illegible]-10:

$x_1+x_2+x_3 \ldots.$[illegible] n [illegible] M [illegible]. [illegible] $\sum_{i=1}^{n}(X_i—2) =110$ [illegible] $\sum_{i=1}^{n}(X_i -5)=80$ [illegible] n [illegible] m [illegible] .

[illegible] [illegible]- $\sum_{i=1}^{n}(X_1-2)$ $=110 \Rightarrow \sum_{i=1}^{n}(X_i-2) = (X_1-2) + (X_2-2) + (X_3-2)\ldots + (X_n-2) = 110 \Rightarrow (X_1+X_2+X_3+\ldots X_n) - 2n = 110 \Rightarrow nM - 2n = 110$.......(i)

[$\because \frac{x1+x2+x3\ldots+x}{n} = M$] . Z[illegible] [illegible] $\sum_{i=1}^{n}(X_i - 5) = 80 \Rightarrow nM - 5n = 80$ ....(ii)

(i) [illegible] (ii) [illegible] [illegible] [illegible] [illegible] $3n = 30 \Rightarrow n = \frac{30}{3} = 10$

N [illegible] [illegible] (i) [illegible] [illegible] [illegible] [illegible] [illegible] $10M - 2 X 10 = 110 \Rightarrow 10M = 110 + 20 = 130 \Rightarrow M = \frac{130}{10} = 13 \therefore n = 10$ [illegible] $M = 13$ ([illegible])

[illegible] - 5(a)

1. [illegible] T [illegible] F [illegible].

(i) [illegible].

(ii) [illegible].

(iii) [illegible] data [illegible] data [illegible].

(iv) [illegible] data [illegible].

(v) [illegible] data [illegible] 20 [illegible] 15 [illegible] 5 [illegible].

(vi) [illegible] n [illegible] $= \frac{n+1}{2}$ [illegible].

(vii) [illegible] n [illegible] $=2n+2$.

(viii) [illegible] 10 [illegible].

(ix) 15 [illegible] 17 [illegible] 2 [illegible] 8.5 [illegible].

(x) [illegible] 20 [illegible], [illegible] 20 [illegible].

2. [illegible]

(i) 61,62, 68, 56, 64, 72, 69, 51, 71, 67, 70, 55, 63 [illegible]

(A) 10 (B) 60 (C) 70 (D) 72

(ii) [illegible] 20 [illegible]?

(A)10 (B) $10\frac{1}{2}$ (C) $\frac{21}{20}$ (D) 210

(iii) [illegible] n [illegible]?

(A) $\frac{n-1}{2}$ (B) $\frac{n}{2}$ (C) $\frac{n+1}{2}$ (D) n

(iii) [illegible] n [illegible]?

(A) (n- 1) (B) n (C) n+1 (D) n+2

(iv) [illegible] n [illegible]?

(A) (n-11) (B) n (C) n+1 (D) n+2

(v) M [illegible] 10 [illegible] 2 [illegible] 10 [illegible].

(A) M (B) 2m (C) m^2 (D) m+2

(vi) M [illegible] n [illegible]

(A) $\frac{M}{4}$ (B) M (C) 4M (D) $\frac{4}{M}$

(vii) M [illegible] n [illegible] x [illegible]

(A) M (B) (M+x) (C) Mx (D) (M- x)

(viii) M [illegible] n [illegible] 5 [illegible]

(A) M (B) $\frac{M}{5}$ (C) 5M (D) M -5

(x) [illegible] a [illegible] 12 [illegible] b [illegible] 10 [illegible]?

(A) $\frac{10a+1}{a+b}$ (B) $\frac{12a+1\quad b}{a+b}$ (C) $\frac{10a+1}{a+b}$ (D) $\frac{12a+10b}{10+12}$

(xi) 998.9, 999.1, 1000.3, 1000.6, 1000.1 [illegible]?

(A) 998 (B) 999 (C) 1000 (D) 1001

(xii) 6,8,57, x [illegible] 4 [illegible] 7 [illegible] x [illegible]?

(A) 10 (B) 11 (C) 12 (D) 13

(xiii) $x_1, x_2, x_3, x_4, x_5, x_6$ [illegible] M [illegible] $\sum_{i=1}^{6}(X_i - M)$ [illegible]?

(A) 0 (B) 6 (C) 36 (D) – 6

(xiv) x, x+2, x+4, x+6, x+8 [illegible]?

(A) X+2 (B) x+4 (C) x+6 (D) x

(xv) 18 [illegible]?

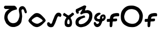
(A) 5 (B) 6 (C) 6.5 (D) 7

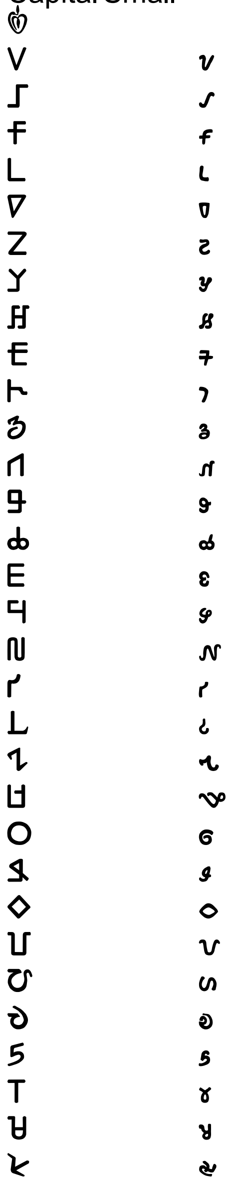
::::::::::::::::::

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Key to Read this book





Capital	Small	Eng.	Odia	Pronunciation
		-	ଓଁ	ଅଓ୍ଁ
		n	ଙ୍	ୟାଁ
		a	ଆ, ା	ଆଆଃ
		i	ି	ଉଇଃ
		u	ୁ ୂ	ୟୁଃ
		e	ଏ, େ	ଆଃଏ
		o	ଓ, ଅ	ଅହ୍
		-	ଃ	ହେୟାଃ
		y	ୟ୍	ୟଃ
		ii	ଇ	ଇ
		uu	ଉ	ଉ
		ng	ଂ	ଅଙ୍
		g	ଗ୍	ଗାଃଏ
		k	କ୍	କାଃ
		nj	ଞ୍	ଇଞ୍
		j	ଜ୍	ଇଜ୍
		ch	ଚ୍	ଇଚ୍
		-	ଣ୍	ଏଣ୍
		d	ଡ୍	ଓଡ୍
		t	ଟ୍	ଟୋଃ
		n	ନ୍	ନୁଂ
		-	ଦ୍	ଦାଃ
		-	ତ୍	ଅତ୍
		m	ମ୍	ଆମ୍
		b	ବ୍	ବୁ
		p	ପ୍	ପୁଉଃ
		h	ହ୍	ହ୍ୟ
		l	ଲ୍	ହ୍ଲ
		-	ଳ୍	ହଳ୍
		r	ର୍	ହାର୍
		sh	ଷ୍	ଷୁ
		c,s	ସ୍	ସି